



## 2003 ENVIRONMENTAL MONITORING OVERVIEW

Water quality monitoring, assessment and management in Massachusetts are sequentially performed in accordance with a rotating five-year watershed schedule. Surface waters in each watershed are sampled during Year 2 of the cycle. The Environmental Monitoring Program of the Division of Watershed Management (DWM) Watershed Planning Section performed monitoring activities in 2003 primarily within the Blackstone, Chicopee, Connecticut and Nashua watersheds. In consultation with DEP regional office personnel and other interested parties DWM monitoring coordinators reviewed specific monitoring needs within the respective watersheds and formulated individual watershed monitoring plans that were subsequently incorporated into a single comprehensive *Quality Assurance Project Plan (QAPP) for 2003 Watershed Monitoring*. This plan was prepared to ensure effective and efficient sampling design and to ensure that all data gathered meet specific data quality objectives (e.g., the data are representative of field conditions; are as accurate and precise as possible given available monitoring resources). In addition, existing and newly revised programmatic QAPPs were used for selected DWM monitoring functional elements such as benthic macroinvertebrate, fish and periphyton studies, and for monitoring in support of the development of lake nutrient criteria. Finally, a series of field QA/QC audits were carried out to evaluate the performance of monitoring crews and to ensure that sampling was carried out in accordance with the specifications of the QAPP and the DWM's standard operating procedures (SOP).

While some of the DWM monitoring activities in 2003 were focused directly on specific issues in the respective "Year Two" watersheds, other monitoring in those watersheds was aimed at providing the necessary information to determine the extent to which water bodies are supporting their intended uses, as defined by the Massachusetts Surface Water Quality Standards. This information will be used in the preparation of individual watershed assessment reports, the Massachusetts Integrated List of Waters submitted to the EPA in fulfillment of sections 305b (Summary of Water Quality) and 303d (List of Impaired Waters) of the Clean Water Act (CWA), and will provide, in part, "the percent of waters that are safe for fishing, and support aquatic life and recreation", and other BRP "environmental indicators" identified in the State-EPA Performance Partnership Agreement (PPA).

Efforts to gather lake data in support of the Massachusetts TMDL program were limited in 2003 to a sampling program for Quaboag and Quacumquasit ponds in the Chicopee watershed. Additional lake monitoring was aimed at gathering data in support of ongoing nutrient criteria development efforts. Forty lakes scattered throughout Massachusetts were chosen for study.

Due to resource limitations in 2003 DWM was unable to provide fish toxics monitoring support as it has in the past. DWM sampling was limited to one pond in support of the USEPA National Study on Chemical Residues in Lake Fish Tissue. DEP's Office of Research and Standards (ORS) continued some fish contaminant monitoring using a private contractor for field collections.

A brief summary of DWM monitoring activities accomplished in 2003, both in the “Year Two” watersheds and state wide, is presented below.

## **BLACKSTONE**

### **1) Water quality:**

Water quality sampling was performed in the Blackstone watershed to provide data for 305(b) assessment and to document known or suspected water quality problems. Water quality surveys were conducted during the weeks of April 21-25, May 19-23, June 23-27, July 21-25, August 25-29 and September 29-October 3. Samples for TSS and nutrient analyses were obtained from a total of twenty (20) stations. Dissolved oxygen and other field parameters were measured at twenty-three (23) sites. Samples for bacterial analysis (fecal coliform and E. coli) were obtained from twenty-one (21) sites. Some additional dissolved oxygen measurements were obtained from selected sites on September 12 and 26, and two supplemental water quality sampling events were added at the beginning of October following a power failure and subsequent sewage by-pass at the UBWPAD wastewater treatment facility.

<b>River/Stream</b>	<b>Monitoring Site Description (sample type*)</b>
Kettle Brook	Dnstr. from Earle Street, Leicester (1,2,3)
Kettle Brook	Upstr. from Oxford Street, Worcester (1,2,3)
Dark Brook	Dnstr. from Route 12 (at footbridge), Auburn (1,2,3)
Middle River	West of the northernmost crossing of Millbury Street, Worcester (1,2,3)
Beaver Brook	Upstrm. from Park Avenue, Worcester (1,2,3)
Unnamed Tributary - “Mill Brook”	At confluence with the Middle River off Ballard Street, Worcester (1)
Blackstone River	Upstr. from UPBWAD effluent channel, Millbury (5)
Blackstone River	Dnstr. from UPBWAD effluent channel, Millbury (1)
Blackstone River	Upstr. from McCracken Road, Millbury (1,2,3,5)
Blackstone River	Dnstr. from Singing Dam, Sutton (1,2,3)
Blackstone River	Dnstr. from Water Street, Millbury (1)
Blackstone River	Upstr. from Route 122A, Grafton (5)
Blackstone River	Dnstr. from Depot Street, Grafton (5)
Blackstone Canal	Dnstr. from Pleasant Street, Grafton (5)
Blackstone River	Upstr. from Sutton Street, Northbridge (1,2,3,5)
Blackstone River	South of Church St. Ext. bridge, Northbridge (5)
Quinsigamond River	Upstr. from Pleasant Street, Grafton (1,2,3)
Blackstone River	Upstr. from footbridge, outlet of Rice City Pond, Uxbridge (3)
Blackstone River	Dnstr. from East Hartford Avenue, Uxbridge (5)
Blackstone River	Upstr. from Route 16, Uxbridge (5)
Mumford River	Off Manchuag Road, East Douglas (1,2,3)
Mumford River	Dnstr. from Guilford of Maine diffuser, Uxbridge (1,2,3)
Mumford River	Dnstr. from outlet of Caprons Pond, Uxbridge (1,2,3)
West River	Upstr. from Glen Avenue, Upton (1,2,3)
West River	Upstr. from Hecla Street, Uxbridge (1,2,3)
West River	Upstr. from East Hartford Avenue, Upton (1,2,3)
Blackstone River	downstream of Bridge Street Dam, Blackstone (1,2,3)
Blackstone River	Upstr. from Central Street, Millville (1,2,3)

Blackstone River	Upstr. from Blackstone Gorge, Blackstone (5)
Mill River	Upstr. from Route 16, Hopedale (1,2,3)
Mill River	Upstr. from Summer Street, Blackstone (1,2,3)
Peters River	Upstr. from Wrentham Street, Bellingham (1,2,3)
Emerson Brook	Upstr. from Route 146 off ramp to Chocolog Rd, Uxbridge (4)
Laurel Brook	Upstr. from West Street, Uxbridge (4)
Scadden Brook	Upstr. from West Street, Uxbridge (4)
Coal Mine Brook	Dnstr. from Plantation Street, Worcester (4)
Drain to Coal Mine Br	Dnstr. from Plantation Street, Worcester (4)

\*1-Dissolved oxygen/multi-probe, 2-TSS/nutrient, 3-bacteria samples, 4-continuous temperature, 5-special UBWPAD facility upset assessment

2) **Biological monitoring:** Benthic macroinvertebrate, periphyton and fish community assessments were performed according to the table below. Habitat assessments were also performed at most of these sites. The major goals of these activities were: 1) To assess the aquatic life use status for 305(b) reporting requirements, 2) To evaluate water quality and habitat quality of previously unassessed stream segments, 3) To assess the effects of known or potential point and nonpoint source pollution inputs, and 4) To re-evaluate water quality and habitat quality at stations historically sampled by DEP in an attempt to determine if conditions have improved or worsened over time. The macroinvertebrate and fish sampling procedures utilized Rapid Biomonitoring Protocols (RBPs). Periphyton assessments were performed at three sites where macroinvertebrate sampling was conducted. This consisted of an approximation of the algal coverage within the reach, and scrapes of various substrates within the riffle zone to obtain samples for taxonomic identification to genus.

<b>Blackstone</b>	
Biomonitoring Site Descriptions	
Blackstone River upstr. from McCracken Road, Millbury (1)	
Mumford River off Manchuag Road, East Douglas (1)	
Mumford River 100 m. dnstr. From Douglas POTW (1)	
Blackstone River Upstr. from Central Street, Millville (1)	
Emerson Brook upstr. from Route 146 off ramp to Chocolog Rd, Uxbridge (2)	
Laurel Brook upstr. from West Street, Uxbridge (2)	
Scadden Brook upstr. from West Street, Uxbridge (2)	
Coal Mine Brook dnstr. from Plantation Street, Worcester (2)	
Spring Brook dnstr. from Providence Street, Mendon (2)	
Tinkerville Brook upstr. from Hemlock Street, Douglas (2)	
Cedar Swamp Brook dnstr. from Southeast Main Street, Uxbridge/Douglas (2)	
Taft Pond Brook dnstr. from sand pit access road off South Street, Upton (2)	
Center Brook upstr. from Mendon Road, Upton (2)	
Miscoe Brook dnstr. from Merrian Road, Grafton (2)	
Miscoe Brook upstr. from Oak Drive, Mendon/Upton (2)	
Greene Brook dnstr. from Pery Street, Douglas (2)	
Cook Allen Brook dnstr. from Mendon Road, Sutton (2)	

\*1-Macroinvertebrate and habitat assessment, 2-Fish population

## **CHICOPEE**

### **1) Water quality:**

Water quality sampling was performed in the Chicopee Watershed in both previously assessed and unassessed waters to provide data for 305(b) assessment and to identify causes and sources of pathogens and other pollutants to 303(d)-listed (impaired) waters. Water quality surveys were conducted during the weeks of April 14-18, May 12-16, June 16-20, July 28-August 1, August 18-22 and October 13-17. Additional samples were taken monthly at the Quaboag P study sites as noted below ("TMDL Lakes"). For the three summer surveys, sampling on consecutive days was performed in order to compare daytime and pre-dawn ambient water conditions, particularly diel fluctuations in dissolved oxygen content. Thirty-six stations, as described in the table below, were sampled on each sampling occasion. Daytime sampling included in-situ measurements comprising, temperature, depth, pH, dissolved oxygen & percent saturation, specific conductance, and total dissolved solids. Water chemistry samples were also collected and analyzed for nutrients (total phosphorus and ammonia) as well as bacteria (fecal coliform and E. coli). During the pre-dawn surveys, only the aforementioned in-situ measurements were taken. In order to meet sample holding times TSS, nutrient and bacterial analyses were performed through a contractual arrangement with Severn Trent Labs of Westfield, MA.

<b>River/Stream</b>	<b>Monitoring Site Description</b>
Chicopee River	Rte. 116 bridge (alt sta. Rte. 33 bridge), Chicopee
Chicopee River	West St. bridge, Indian Orchard; Springfield
Chicopee River	Miller Street bridge, Wilbraham
Chicopee River	Bridge St., Three Rivers, Palmer
Abbey Brook	Front Street bridge, Chicopee*
Cooley Brook	Fuller Street bridge, Chicopee*
Poor Brook	Main Street, Chicopee*
Fuller Brook	Shawinigan Drive, Chicopee*
Fuller Brook	West St. at Roy St., Ludlow*
Quaboag River	Palmer St. bridge, Palmer
Quaboag River	Off Rte. 67 at USGS gage, SMART station, West Brimfield
Quaboag River	Gilbert Road bridge, West Warren
Quaboag River	Davis Road, West Brookfield
Quaboag River	Rte. 148 bridge, Brookfield
Forget-Me-Not Brook	E. Brookfield Rd. bridge (north), N. Brookfield*
Forget-Me-Not Brook	E. Brookfield Rd. bridge (south), N. Brookfield*
Dunn Brook	Quaboag St. bridge, Brookfield
Ware River	Palmer St. bridge, Palmer
Ware River	Rte. 32 bridge – Gibbs Crossing, Ware
Ware River	Upper Church St. bridge, Ware
Ware River	Creamery Road bridge, New Braintree
Ware River	Airport Road (alt. Hardwick Rd), Barre
Ware River	Off Rte. 122 at USGS gage, Barre
Ware River	New Braintree Rd. bridge, White Valley, S. Barre
Ware River	Cold Brook Road below Barre Falls Dam, Barre

Swift River	Rte. 181/State St., Palmer
Swift River	Off River Road, W. Ware
Swift River	Cold Spring Road, Belchertown/ Ware
East Brookfield River	Rte. 9 bridge, E. Brookfield
Cranberry Brook	So. Spencer Rd., Spencer
Seven Mile River	Rte. 49 bridge, Spencer*
Seven Mile River	Cooney Road bridge, Spencer
Quaboag/South Ponds - flow gate	Lake Road, Brookfield/ E. Brookfield
East Brookfield River	Shore Rd. bridge, E. Brookfield
Seven Mile River	Rte. 9 bridge, Spencer*
Spencer POTW discharge	Treatment Plant off Rt. 9, Spencer

\* habitat assessment completed

## 2) TMDL Lakes:

Quaboag and Quacumquasit Ponds as well as seven associated stream stations (also included in the above table) were selected for a phosphorus loading study in order to provide data in support of the DWM TMDL program. The study included the following five components:

- 1) Baseline lake sampling during the summer, including three monthly samples and one Hydrolab profile. Monthly samples for total phosphorus analysis and Secchi disk depth were obtained from the lakes for a period of one year.
- 2) Monthly monitoring of inputs from point (Spencer POTW) and non-point sources (tributary streams) and including flow measurements, staff gage readings, and surface grab samples from the ponds.
- 3) Stormwater collections of nutrient inputs (some of which replaced the monthly sampling described above).
- 4) Collection of ancillary POTW samples during one summer sampling event to obtain data in support of a QUAL2-type model, in the event that a model is needed for the TMDL.
- 5) Water flow rates were recorded three times (high, medium, low flow) at five river sites, the Spencer POTW and, occasionally, at the Quacumquasit gate. The flows will be related to stage readings to establish a rating curve.

The primary focus of the study was to determine how much phosphorus input to the two ponds originates from point sources vs. nonpoint sources. The discharge from the Spencer POTW is complicated by the fact that most of the effluent is lost to groundwater in the constructed wetlands and further retention of phosphorus may occur in wetlands en route to the pond. The approach involved a mass balance study in which both flow and TP upstream and downstream of the point sources, and at the tributary sites, was measured. Because of the long retention time for Quacumquasit Pond, the study necessitated a year-round analysis of nutrient inputs, beginning in December of 2002. Monthly sampling was performed for the nutrient flux study.

**3) Biological monitoring:** Biological monitoring in the Chicopee watershed entailed habitat assessments at nine stations, as noted in the above table, and fish population assessments that were completed by MDFG Central District Office personnel at a total of 27 sites distributed as follows: East Branch Swift River (6 sites), Quaboag River (5 sites), Ware

River (3 sites), East Branch Ware River (2 sites), Prince River (2 sites), Mill Brook (2 sites), and one site each in the West Branch Ware River, Burnshirt River, Canesto Brook, Pleasant Brook, Moccasin Brook, West Branch Fever Brook, and Parker Brook.

## **CONNECTICUT**

### **1) Water quality:**

Water quality sampling was performed in the Connecticut watershed to provide data for 305(b) assessment and to document known or suspected water quality problems. Water quality surveys were conducted during the weeks of April 28 – May 2, June 2-6, July 7-11, August 4-8, September 8-12, and September 29 – October 3. Dissolved oxygen and other field parameters were measured at a total of twenty (20) sites. Samples for TSS and nutrient analyses were obtained from a total of twenty-four (24) stations. Samples for bacterial analysis (fecal coliform and E. coli) were obtained from twenty (20) sites. In order to meet sample holding times TSS, nutrient and bacterial analyses were performed through a contractual arrangement with Severn Trent Labs of Westfield, MA. Water samples for chlorophyll-a analyses were collected from fifteen (15) sites and examined by DWM in Worcester, MA.

<b>River/Stream</b>	<b>Monitoring Site Description (sample type*)</b>
Connecticut River	Route 10, Northfield (1,2,3,4)
Connecticut River	Riverview Picnic Area, Northfield (1,2,3,4)
Connecticut River	Route 116, Sunderland (1,2,3,4)
Connecticut River	Oxbow Marina, Easthampton (1,2,3,4)
Connecticut River	Route 90, Chicopee (1,2,3,4)
Connecticut River	USGS Gage, Enfield, CT (1,2,3,4)
Millers River	Route 63, Millers Falls (2)
Deerfield River	Route 5, Greenfield (2)
Chicopee River	Route 116, Chicopee (2)
Westfield River	Route 147, Westfield (2)
Sawmill River	South Ferry Road, Montague (1,2,3,4)
Mill River (Hadley)	Mill Site Road, Hadley (1,2,3,4)
Fort River	Route 47, Hadley (1,2,3,4)
Bachelor Brook	Route 47, South Hadley (1,2,3,4)
Stony Brook	Route 116, South Hadley (1,2,3)
Weston Brook	Rural Street, Belchertown (1,2,3)
Lampson Brook	George Hannum Street, Belchertown (1,2,3)
East Branch Mill River (Northampton)	Mill Street, Williamsburg (1,2,3)
West Branch Mill River (Northampton)	Mill Street, Williamsburg (1,2,3)
Mill River (Northampton)	USGS gage near Burts Pit Road, Northampton (1,2,3,4)
Mill River (Hatfield)	Elm Street, Hatfield (1,2,3,4)
Bloody Brook	Whatley Road, South Deerfield (1,2,3,4)
Manhan River	Glendale Street, Easthampton (1,2,3,4)
Manhan River	Fort Hill Street, Easthampton (1,2,3,4)

\*1-Dissolved oxygen/multi-probe, 2-TSS/nutrients, 3-bacteria samples, 4- chlorophyll-a analyses

Additional water quality sampling occurred within the Bloody Brook sub-watershed to further

investigate low D.O. measurements recorded at Whately Road. Eleven (11) synoptic stations in the Bloody Brook sub-watershed were examined using a Hydrolab on 12 August 2003.

## 2) Biological monitoring:

Biological monitoring in the Connecticut watershed entailed macroinvertebrate, fish population, and habitat assessments. The following is a brief description of these monitoring elements.

### A. Macroinvertebrate Assessments:

Macroinvertebrate monitoring and habitat assessment were performed at a total of twelve (12) sites. These are listed below. The major goals of these activities were: 1) To assess the aquatic life use status for 305(b) reporting requirements, 2) To evaluate water quality and habitat quality of previously unassessed stream segments, 3) To assess the effects of known or potential point and nonpoint source pollution inputs, and 4) To re-evaluate water quality and habitat quality at stations historically sampled by DEP in an attempt to determine if conditions have improved or worsened over time. The macroinvertebrate sampling procedure utilized Rapid Biomonitoring Protocols (RBP) and the Pupal Exuvia Methodology (PEM).

<b>Connecticut Watershed</b>
Biomonitoring Site Description (sample type*)
Connecticut River, Route 10, Northfield (2)
Connecticut River, Kellogg Hill Road, Hatfield (2)
Connecticut River, Great Neponset Road, Hatfield (2)
Falls River, Bascom Road, Greenfield (1,2,3)
Sawmill River, South Ferry Road, Montague (1,2,3)
Cushman Brook, State Street, Amherst (1,2,3)
Stony Brook, Route 116, South Hadley (1,2,3)
Amethyst Brook, Pelham Road, Amherst (1,2)
Mill River – Hadley, Mullins Way, Amherst (3)
Mill River – Hatfield, Mountain Drive, Hatfield (1,2)
East Branch Mill River – Northampton, Mill Road, Williamsburg (1,2,3)
West Branch Mill River – Northampton, Mill Road, Williamsburg (1,2,3)
Mill River – Northampton, USGS gage nr Burts Pit Road, Northampton (1,2)

\*1-Macroinvertebrate-RBP, 2-Macroinvertebrate-PEM, 3-Fish population

### B. Fish Population Assessments:

Fish population and habitat assessments were conducted by the DWM at six (6) sites denoted in the above table to provide a more comprehensive assessment of the aquatic life use status of waterbodies in the Connecticut watershed. Methods used to assess fish populations followed a modified version of the USEPA Rapid Bioassessment Protocol V (RBPV). The MDFG performed fish population assessments at an additional seventeen (17) locations in the Connecticut watershed. These are listed below.

Buffum Brook  
Amethyst Brook

Gates Brook  
Harris Brook

Dunlop Brook  
 Adams Brook  
 Nourse Brook  
 Hannum Brook  
 Harts Brook  
 Sawmill River (six sites)  
 Mill River – Northampton

Baker Brook  
 Dean Brook  
 Broad Brook  
 Plum Brook  
 Fort River  
 Bassett Brook

## **NASHUA**

### **1) Water quality:**

Water quality sampling was performed in the Nashua watershed to provide data for 305(b) assessment, to document known or suspected water quality problems, and to provide supplemental information for ongoing simulation modeling and TMDL implementation activities. Water quality surveys were conducted during the weeks of April 7-11, May 5-9, June 9-13, July 14-18, August 11-15, September 15-19, and October 6-10. Dissolved oxygen and other field parameters were measured at twenty-one (21) sites. Samples for nutrient and bacteria (fecal coliform, E. coli and Enterococci) analyses were obtained from those same sites. Samples for suspended solids/turbidity analyses were collected at fifteen (15) sites. Flow gaging, chlorophyll-a analyses, additional nutrient (phosphorus) sampling and continuous temperature monitoring were performed at selected sites according to the table below. Note that not all analyses were performed during every sampling event.

<b>River/Stream</b>	<b>Monitoring Site Description (sample type*)</b>
North Nashua River	Dnstr. from Route 31, Fitchburg (2)
North Nashua River	Dnstr. from Mill #9 bridge, Fitchburg (1,2,3,4)
North Nashua River	Airport Road, Fitchburg (1,2,3,4)
North Nashua River	Adjacent to Searstown Mall, Leominster (1,2,3,4)
North Nashua River	Dnstr. from I-190 bridge, Lancaster (1,2,4)
Flag Brook	Dnstr. from Saw Mill Pond, Fitchburg (2)
Whitman River	Upstr. from Route 2A, Westminster (1,2,3,4,6)
Unnamed tributary from Round Meadow Pond	Upstr. from Depot Road, Westminster (2,6)
Phillips Brook	Dnstr. from Westminster Hill Road, off Baltic Lane, Fitchburg (1,2,4)
Monoosnuc Brook	Upstr. from Commercial Road, Leominster (1,2,3,4,6)
Nashua River "South Branch"	Upstr. from MWRA-Clinton WWTP, Clinton (1,2,3,4)
Nashua River "South Branch"	Upstr. from Bolton Road, Lancaster (1,2,4)
Nashua River	At boat ramp in Oxbow Wildlife Refuge, Harvard (1,2,4)
Nashua River	Upstr. from Ayer Road/West Main Street, Shirley/Harvard (2,3,7)
Nashua River	Dnstr. from Route 2A, Shirley/Ayer (1,2,3,4,6)
Nashua River	At Groton School boat house, Groton (2,7)
Nashua River	Dnstr. from Rtes. 111/119, Groton/Pepperell (1,2,3,4,7)
Nashua River	Approx. 1/2 mile dnstr. from covered bridge at Groton Street, Pepperell (1,2,4)
Still River	At Route 117, Bolton (1,2,3,4)
Catacoonamug Brook	Upstr. from Lovell Road, Shirley (1,2,3,4,6)
Nonacoicus Brook	Upstr. from MacPherson Road, Ayer (1,2,3,4,6)
Mulpus Brook	Downstr. from Lawton Road in trailer park, Shirley (1,2,3,4,6)



James Brook	Downstr. from Route 111, Ayer (1,2,3,4,6)
Squannacook River	Upstr. from Old Turnpike Road, Townsend (2)
Squannacook River	Dnstr. From Route 13, Townsend (5)
Squannacook River	Downstr. from South Street, Townsend (2,5)
Squannacook River	Off west side of Townsend Road (directly across from Candice Lane), Groton (1,2,4,5)
Squannacook River	Downstr. from Route 225, Shirley/Groton (1,2,3,4)
Nissitissit River	Downstr. from Canal Street, Pepperell (1,2,4)

\*1-Dissolved oxygen/multi-probe, 2-nutrients, 3-TSS/turbidity, 4-bacteria samples, 5-continuous temperature, 6-flow measurement, 7-chlorophyll-a analyses

2) **Biological monitoring:** DWM biological monitoring in the Nashua drainage system entailed macroinvertebrate and periphyton monitoring and habitat assessments. The major goals of these activities were: 1) To assess the aquatic life use status for 305(b) reporting requirements, 2) To assess the effects of known or potential point and nonpoint source pollution inputs, and 3) To re-evaluate water quality and habitat quality at stations historically sampled by DEP in an attempt to determine if conditions have improved or worsened over time. The macroinvertebrate sampling procedure utilized Rapid Biomonitoring Protocols (RBP) and was performed at a total of five (5) sites. Periphyton collections were made at the four North Nashua River sites (see table below).

<b>Nashua</b>
Biomonitoring Site Description
North Nashua River downstream from Mill #9 bridge, Fitchburg
North Nashua River at Airport Road, Fitchburg
North Nashua River adjacent to Searstown Mall, Leominster
North Nashua River at Ponakin Mill, Lancaster
Quinapoxet River downstream from River Street, Holden

In addition to the biomonitoring described above, the Central District Office of the Massachusetts Division of Fish and Game assessed fish populations at 42 sites in 2002 and the Northeast District assessed an additional 20 sites in 2003. DWM will review these data when completing aquatic life use assessments for the Nashua River watershed in the future.

**ADDITIONAL MONITORING ACTIVITIES** – Some monitoring was performed in watersheds that were not actually in “Year 2” of the five-year watershed cycle. This is briefly described below:

1) **Fish toxics monitoring:** Due to resource limitations DWM significantly reduced from previous years the level of effort focused on fish toxics monitoring. Fish samples were collected from Rockwell Pond (Leominster) in support of the ongoing USEPA National Study on Chemical Residues in Lake Fish Tissue.

## 2) **Lakes Monitoring for Nutrient Criteria Development:**

Forty lakes statewide (see table below) were sampled on one occasion to provide data in

support of the DWM nutrient criteria derivation effort. Lake monitoring included in situ water quality profile measurements (i.e., temperature, dissolved oxygen, pH, specific conductance), Secchi disk readings, water quality sampling for phosphorus analysis, aquatic vegetation mapping, chlorophyll a determinations and the analysis of apparent color.

<b><i>Lakes Sampled for Nutrient Criteria Development</i></b>					
<b>Name</b>	<b>Municipality</b>	<b>Name</b>	<b>Municipality</b>	<b>Name</b>	<b>Municipality</b>
1.Garfield	Monterey	15.Sherman	Brimfield	29.Shirley	Lunenburg
2.Laurel	Lee	16.Pierpont	Dudley	30.Farm	Framingham
3.Mansfield	Gr. Barrington	17.Manchaug	Sutton	31.Whitehall	Hopkinton
4.Prospect	Egremont	18.Quinsigamond	Shrewsbury	32.Cochituate	Natick
5.Congamond	Southwick	19.Falls	N. Attleboro	33.Newfield	Chelmsford
6.Yokum	Becket	20.Ames Long	Stoughton	34.Massapoag	Dunstable
7.Plainfield	Plainfield	21.Furnace	Pembroke	35.Stearns	N. Andover
8.Metacomet	Belchertown	22.Stetson	Pembroke	36.Baldpate	Boxford
9.UpHighland	Goshen	23.Horn	Woburn	37.Beck	Hamilton
10.Laurel	Erving	24.Jamaica	Boston	38.Fresh	Plymouth
11.Stoddard	Winchendon	25.Pearl	Wrentham	39.Gr. Herring	Bourne
12.Whitney	Winchendon	26.Uncas	Franklin	40.Noquochoke	Dartmouth
13.Rohunata	Athol	27.Fort	Lancaster		
14.Lorraine	Springfield	28.Partridge	Westminster		